

## 2. A Revision of the African and Syrian Fishes of the Family *Cichlidæ*.—Part I. By G. A. BOULENGER, F.R.S.

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(Plate XIX.)

The *Cichlidæ* form a very natural family of Perciform Acanthopterygians, which may be defined as follows:—

No suborbital lamina of the suborbitals; entopterygoid present, small. Præcaudal vertebræ with transverse processes from the third to the last; ribs, all but the last few nearly sessile, inserted behind the transverse processes, not at their extremity, and narrowly separated if at all from the centra. Nostril single on each side. Gill-membranes free from isthmus; five or six branchiostegals; gills four, a slit behind the fourth; pseudobranchiæ absent. Lower pharyngeal bones united, with persistent median suture. Soft portion of dorsal fin not more developed than the anal: latter with three or more spines.

The term "*Chromides*," by which this family is often designated, is inadmissible, the name *Chromis* having been originally intended for *Sparus chromis*, L.=*Chromis castanea*, Risso, a *Heliastes* of Cuvier and Valenciennes. Cuvier, in the second edition of the 'Règne Animal,' referred to *Labrus niloticus* only as a second species of his genus *Chromis*, the definition of which is drafted from *Sparus chromis*. *Sparus niloticus* can therefore not be retained as the type of *Chromis*, and must be placed in the genus *Tilapia* of Andrew Smith, in the family named *Cichlidæ* by Bleeker (1859).

This family includes a large number of brackish- and freshwater fishes from Africa, Syria, India, and Central and South America, one species extending into Texas.

The nearest affinity of these Fishes is with the *Centrarchidæ* and *Percidæ*. A study of their skeleton shows them to bear no special relation to the *Pomacentridæ*, *Labridæ*, *Scaridæ*, or to any other division of the 'Pharyngognathi,' than which a more artificial group has never been conceived. Yet, I regret to say, it is very slow at being altogether abandoned, remains of it lingering here and there in the works of even the most advanced reformers—to wit, Gill's superfamilies *Pomacentroidea* and *Labroidea* (1893), corresponding to the Suborders *Chromides* and *Pharyngognathi* of Jordan and Evermann (1896).

In the present paper I shall deal only with the genera represented in Africa and Syria, of which I am able to distinguish nine. All agree in having the palate toothless, no supplemental maxillary, a single, continuous dorsal fin, and two distinct lateral lines. The number of vertebræ varies, in the specimens examined by me, between 26 and 38 (13–19 + 12–19).

I am under deep obligations to Professor Vaillant for his kind assistance in communicating to me the types of several species preserved in the Paris Museum. I have thus been enabled to

make this revision more complete than would otherwise have been possible, and to settle some points of synonymy which, from the imperfection of the original descriptions, would have remained unsolved. I seize this opportunity to express my thanks to Professor Vaillant for the valuable help I have received from him in connection with the celebrated collection in his charge, on this and many previous occasions.

My thanks are also due to Mr. J. Green, who has kindly furnished me with sciagraphs of some unique specimens, by means of which I have been able to ascertain the number of vertebræ.

### *Synopsis of the Genera.*

#### I. No sheath to the vertical fins.

A. Anal spines VI or VII; teeth conical, some enlarged and canine-like ..

1. *Lamprologus*, Schilth.

B. Anal spines III or IV.

1. Teeth not notched, unicuspid.

a. Alveolar surface of jaws narrow or moderately broad.

a. No pad-like papillose prominence close to the upper part of the branchial arches.

\* Teeth in one or two series, with more or less enlarged or canine-like ones at the symphysis .....

2. *Hemichromis*, Peters.

\*\* Teeth in two or more series in both jaws, outer largest and more or less distinctly curved inwards; no enlarged teeth at the symphysis .....

3. *Paratilapia*, Blkr.

β. A pad-like prominence close to the upper part of the branchial arches.

\* Teeth in two or more series in both jaws, outer largest and more or less distinctly curved inward ...

4. *Pelmatochromis*, Stdr.

\*\* Teeth in one or two series, some of the larger ones with the crown bent at an angle to the shaft and directed forward or backward ...

5. *Chromidotilapia*, Blgr.

b. Alveolar surface of jaws extremely broad, with innumerable minute teeth with compressed, oblique crowns .....

6. *Corematodus*, Blgr.

2. Teeth all or greater part notched or tricuspid.

a. Alveolar surface of jaws narrow or moderately broad; all the teeth notched or tricuspid .....

7. *Tilapia*, Smith.

b. Alveolar surface of jaws very broad; outer teeth large, with nail-shaped entire crowns, those of the inner rows tricuspid .....

8. *Docimodus*, Blgr.

#### II. Vertical fins folding in a scaly sheath; anal spines VIII or IX; teeth spatulate, in a single row .....

9. *Paretroplus*, Blkr.

The three latter genera will be dealt with in the second part of this paper.

## 1. LAMPROLOGUS.

*Lamprologus*, Schilthuis, Tijdschr. Nederl. Dierk. Ver. (2) iii. 1891, p. 85.

Body rather elongate; scales ctenoid. Jaws with a band of very small conical teeth, with enlarged canines in front. Maxillary exposed. Dorsal with 18 or 19 spines, anal with 6 or 7. Vertebrae 31 (15+16).

A single species, from the Congo.

This genus is easily distinguished from other African forms by the number of anal spines; from the American *Heros* by the maxillary not being entirely concealed when the mouth is closed; from *Etroplus* and *Paretroplus* by the dorsal not folding in a scaly sheath, and by the dentition.

## 1. LAMPROLOGUS CONGOENSIS.

*Lamprologus congoensis*, Schilthuis, l. c. pl. vi. fig. 1.

Depth of body  $3\frac{3}{4}$  to 4 times in total length, length of head 3 to  $3\frac{1}{4}$ . Snout a little longer than diameter of eye, which is  $3\frac{1}{2}$  to 4 times in length of head, and equals or slightly exceeds interorbital width; maxillary extending to below anterior border of eye; head naked, or with a few isolated scales on the opercle. Gill-rakers short, 9 or 10 on lower part of anterior arch. Dorsal XVIII-XIX 8-10; spines increasing in length to the last, which measures  $\frac{2}{5}$  length of head and  $\frac{1}{2}$  longest soft rays. Pectoral  $\frac{2}{3}$  to  $\frac{3}{4}$  length of head. Ventral reaching vent or origin of anal. Anal VI-VII 5-6. Caudal rounded, subacuminate. Caudal peduncle as long as deep. Scales 42-53  $\frac{6-7}{14-15}$ ; lat. l.  $\frac{23-26}{8-13}$ . Brownish or olive, uniform or with four or five rather indistinct darker cross-bars; a dark streak behind the eye, and a blackish opercular spot; vertical fins grey, uniform or with small lighter and darker spots.

Total length 100 millim.

Upper and Lower Congo.

## 2. HEMICHROMIS.

*Hemichromis*, Peters, Mon. Berl. Ac. 1857, p. 403; Günther, Cat. iv. p. 274 (1862).

*Chromichthys*, Guichenot, in A. Duméril, Arch. Mus. x. 1859, p. 257.

*Hemichromis*, part., Pfeffer, Thierw. O.-Afr., Fische, p. 19 (1896).

Body short or moderately elongate; scales cycloid. One or two series of conical teeth in the jaws, the second series, if present, short and consisting of a few very small teeth; the two middle teeth in the jaws larger than the others, in the adult at least. Maxillary exposed. Dorsal with 13 to 15 spines, anal with 3. Vertebrae 26-28 (15+13 in *H. fasciatus*, 14+12 in *H. bimaculatus*).

North and West Africa.

1. *HEMICHROMIS FASCIATUS*.

*Hemichromis fasciatus*, Peters, Mon. Berl. Ac. 1857, p. 403; Günth. Cat. iv. p. 274 (1862); Bleek. Nat. Verh. Vet. Haarlem, xviii. 1863, no. 2, p. 38, pl. v. fig. 1; Steindachn. Sitzb. Ak. Wien, lx. i. 1870, p. 970; Sauvage, N. Arch. Mus. (2) iii. 1880, p. 35; Steindachn. Notes Leyd. Mus. xvi. 1894, p. 47.

*Chromichthys elongatus*, Guichen. in A. Dum. Arch. Mus. x. 1859, p. 257, pl. xxii. fig. 3.

*Hemichromis auritus*, Gill, Proc. Ac. Philad. 1862, p. 135; Günth. l. c. p. 275.

*Hemichromis leiguardii*, Capello, Jorn. Sc. Lisb. iv. 1872, p. 85.

*Hemichromis desquezzii*, Rochebrune, Bull. Soc. Philom. (7) iv. 1880, p. 168, and Act. Soc. Linn. Bord. vi. 1882, pl. v. fig. 6.

Middle teeth distinctly enlarged, canine-like; a regular series of very small præmaxillary teeth some distance behind the marginal one.<sup>1</sup> Depth of body equal to or a little greater than length of head,  $2\frac{1}{2}$  to 3 times in total length. Snout with straight or concave upper profile, longer than the eye; in the adult diameter of eye contained 4 to  $5\frac{1}{2}$  times in length of head, and  $1\frac{1}{3}$  to  $1\frac{3}{4}$  in interorbital width; maxillary not extending to below anterior border of eye; 4 or 5 series of scales on the cheek; large scales on the opercle. Gill-rakers short, some hammer-shaped, 6–10 on lower part of anterior arch. Dorsal XIII–XV 11–13; spines increasing in length to the last, which measures  $\frac{1}{3}$  to  $\frac{2}{5}$  length of head and  $\frac{2}{5}$  to  $\frac{3}{5}$  longest soft rays. Pectoral  $\frac{3}{5}$  length of head. Outer ventral rays produced into filaments, reaching the vent or the anal spines. Anal III 8–10; third spine longest,  $\frac{1}{3}$  to  $\frac{2}{5}$  length of head, as long as middle dorsal spines. Caudal truncate or rounded. Caudal peduncle nearly as long as deep. Scales 29–32  $3\frac{3\frac{1}{2}}{10}$ ; lat. l.  $\frac{15-19}{10-14}$ . Olive or brown, with a black or blue spot on the opercle and five more or less distinct dark vertical bars which may be reduced to a series of as many blackish blotches along the side, the last at base of caudal; young with less distinct bars between the principal ones; fins brown or blackish; dorsal and anal sometimes with round whitish spots between the rays; longitudinal series of pearl-colour or brown spots, one to each scale, may be present on the sides.

Total length 200 millim.

The very numerous specimens in the British Museum are from the following localities:—Sierra Leone, Lagos, Old Calabar, Gaboon, Ogowe, Upper and Lower Congo.

2. *HEMICHROMIS BIMACULATUS*.

*Hemichromis bimaculatus*, Gill, Proc. Ac. Philad. 1862, p. 137; Günth. Cat. iv. p. 275 (1862); Steindachn. Sitzb. Ak. Wien, lx. i. 1870, p. 972, pl. i. fig. 5; Sauvage, N. Arch. Mus. (2) iii. 1880,

<sup>1</sup> I have examined a large series of specimens, ranging from 40 to 200 millim. total length, and find the character of the dentition very constant, contrary to what Steindachner was inclined to believe (Sitzb. Ak. Wien, lx. i. 1870, p. 974).



p. 35, pl. ii. fig. 1; Steindachn. Notes Leyd. Mus. xvi. 1894, p. 49; Günth. Ann. & Mag. N. H. (6) xvii. 1896, p. 272.

*Hemichromis guttatus*, Günth. Cat. iv. p. 275.

*Hemichromis letourneuxii*, Sauvage, Bull. Soc. Philom. (7) iv. 1880, p. 212.

*Hemichromis saharae*, Sauvage, l. c. p. 226.

*Hemichromis rolandi*<sup>1</sup>, Sauvage, op. cit. v. 1881, p. 103.

Middle teeth but feebly enlarged; inner præmaxillary teeth absent or reduced to a few, irregularly disposed. Depth of body equal to or a little greater than length of head,  $2\frac{1}{2}$  to 3 times in total length. Snout with straight or convex upper profile, as long as the eye, which is contained  $3\frac{2}{3}$  to 4 times in length of head and equals or is a little less than interorbital width; maxillary extending to below anterior border of eye or not quite so far; 3 or 4 (rarely 5) series of scales on the cheek; large scales on the opercle, which terminates in a rounded, stiff, scaleless lobe. Gill-rakers short, 8 to 10 on lower part of anterior arch. Dorsal XIII-XV 10-12; spines increasing in length to the last, which measures about  $\frac{2}{5}$  to  $\frac{1}{2}$  length of head and  $\frac{1}{2}$  to  $\frac{3}{5}$  longest soft rays. Pectoral  $\frac{3}{5}$  to  $\frac{2}{3}$  length of head. Outer ventral rays produced into short filaments, reaching vent, origin of anal, or even a little beyond. Anal III 7-9; third spine longest, as long as median dorsal spines. Caudal rounded. Caudal peduncle a little deeper than long. Scales 25-28  $\frac{2\frac{1}{2}-3}{9-10}$ ; lat. l.  $\frac{15-19}{7-10}$ . Yellowish, reddish, or brown, with or without rather indistinct dark vertical bars and two or three round blackish spots, the first (sometimes blue) on the opercle, the second below middle of dorsal fin and between the two lateral lines, the third, if present, at base of caudal; sides sometimes with series of pearl-coloured spots; cheeks, opercles, and fins sometimes with round dark brown spots; outer ventral rays brown or blackish.

Total length 120 millim.

This species has a wide distribution. I have examined specimens from Lake Mareotis, Lower Egypt (*H. letourneuxii*, Sauv.), the Algerian Sahara (*H. saharae*, Sauv., *H. rolandi*, Sauv.), Sierra Leone, Old Calabar, Gaboon, the Ogowe, and the Congo.

No reliance can be placed on the locality (Cape of Good Hope) affixed to the types of *H. guttatus*, Gthr., which were purchased of a dealer as being from "Ceylon."

### 3. HEMICHROMIS ? ANGOLENSIS.

*Hemichromis angolensis*, Steindachn. Mem. Ac. Lisb. (3) iii. pt. ii. 1865, no. 10.

Teeth in two rows, outer longest. Depth of body a little greater than length of head, not 3 times in total length. Snout with concave upper profile; diameter of eye 6 times in length of head; 6 or 7 series of scales on the cheek; large scales on the

<sup>1</sup> Should be spelt "*rollandi*," the species being named after the distinguished French engineer G. Rolland.

opercle. Dorsal XV 11; spines increasing in length to the last, which is a little less than half length of longest soft rays. Lat. 1.  $\frac{21}{10-11}$ . Brown; soft dorsal, anal, and caudal with purplish brown spots; a large blackish opercular spot.

Total length 200 millim.

Angola.

This species is known to me only from Steindachner's very imperfect description. Its allocation to the genus *Hemichromis* s. s. is therefore doubtful.

### 3. PARATILAPIA.

*Paratilapia*, Bleeker, Versl. Ak. Amsterd. ii. 1868, p. 307.

*Paracara*, Bleeker, Versl. Ak. Amsterd. xii. 1878, p. 193.

*Hemichromis*, part., Pfeffer, Thierw. O.-Afr., Fische, p. 19 (1896).

Body short or more or less elongate; scales cycloid or ctenoid. Two or more series of conical teeth in the jaws. Maxillary exposed. Dorsal with 10 to 18 spines, anal with 3. Vertebrae 27-38 (13+14 in *P. polleni*, 15+13 in *P. sacra*, 17+19 in *P. robusta*, 19+19 in *P. longiceps*).

Numerous species, from Syria, Tropical and South Africa, and Madagascar.

#### *Synopsis of the Species.*

- |                                                                                                                                     |                                |
|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| I. Dorsal with X-XII (rarely XIII) spines; pectoral $\frac{3}{4}$ length of head.                                                   |                                |
| Dorsal with 11-12 soft rays, which are much longer than longest spines; maxillary extending to below anterior third of eye .....    | 1. <i>polleni</i> , Blkr.      |
| Dorsal with 10 soft rays, which are but little longer than longest spines; anal spines longer and stronger than dorsals .....       | 2. <i>bleekeri</i> , Sauv.     |
| Dorsal with 9-10 soft rays which are much longer than longest spines; maxillary extending to below anterior border of eye .....     | 3. <i>typus</i> , Blkr.        |
| II. Dorsal with XIII-XIV spines.                                                                                                    |                                |
| 4 or 5 series of scales on the cheek; scales 30-32 $\frac{3-4}{13-15}$ ; pectoral at least $\frac{3}{4}$ length of head .....       | 4. <i>sacra</i> , Gthr.        |
| 3 series of scales on the cheek; scales 32 $\frac{6}{12}$ ; pectoral not $\frac{3}{4}$ length of head .....                         | 5. <i>longirostris</i> , Hilg. |
| 3 series of scales on the cheek; scales 26-28 $\frac{2\frac{1}{2}-3}{10}$ ; pectoral $\frac{3}{4}$ length of head .....             | 6. <i>moiffati</i> , Cast.     |
| III. Dorsal with XV-XVIII spines.                                                                                                   |                                |
| A. 6-9 series of scales on the cheek.                                                                                               |                                |
| 1. Dorsal with 15 or 16 soft rays; 2 or 3 series of teeth in the jaws; pectoral $\frac{3}{4}$ to $\frac{2}{3}$ length of head ..... | 7. <i>robusta</i> , Gthr.      |
| 2. Dorsal with 8 or 9 soft rays.                                                                                                    |                                |
| 3 or 4 series of teeth in the jaws; pectoral about $\frac{3}{4}$ length of head .....                                               | 8. <i>cavifrons</i> , Hilg.    |

- 7-9 series of teeth in the jaws; pectoral as long as head ..... 9. *retrodens*, Hilg.
- B. 2-5 series of scales on the cheek; dorsal with 8-12 soft rays.
1. Scales 28-32 in a longitudinal series.
- a. Pectoral  $\frac{2}{3}$  to  $\frac{3}{4}$  length of head.
- Sc. 29-32  $\frac{3}{10}$ ; maxillary not extending to below eye... 10. *afra*, Gthr.
- Sc. 28  $\frac{4\frac{1}{2}}{10}$ ; maxillary extending to below anterior border of eye ..... 11. *bloyeti*, Sauv.
- Sc. 31  $\frac{7}{14}$ ; maxillary extending to below eye ..... 12. *serranus*, Pfeff.
- b. Pectoral as long as head.
- Sc. 30  $\frac{3}{10}$ ; maxillary not extending to below eye ..... 13. *schwebischi*, Sauv.
2. Scales 32-36 in a longitudinal series.
- a. Caudal peduncle slightly longer than deep.
- Sc. 32-34  $\frac{3\frac{1}{2}-4}{12-13}$ ; pectoral  $\frac{2}{3}$  length of head..... 14. *modesta*, Gthr.
- Sc. 35-36  $\frac{4-5}{13}$ ; pectoral  $\frac{4}{5}$  length of head ..... 15. *livingstonii*, Gthr.
- b. Caudal peduncle  $1\frac{1}{2}$ -2 as long as deep.
- Sc. 33-36  $\frac{3}{10-11}$ ; pectoral as long as head ..... 16. *intermedia*, Gthr.
- Sc. 35-36  $\frac{3}{12-13}$ ; pectoral  $\frac{2}{3}$  length of head ..... 17. *dimidiata*, Gthr.
3. Sc. 40-41  $\frac{3\frac{1}{2}}{11}$  ..... 18. *longiceps*, Gthr.

# 1. PARATILAPIA POLLENI.

*Paratilapia polleni*, Bleek. Versl. Ak. Amsterd. ii. 1868, p. 307; Bleek. & Pollen, Poiss. Madag. p. 10, pl. v. fig. 2 (1875); Steindachn. Sitzb. Ak. Wien, 1880, p. 247; Sauvage, Hist. Madag., Poiss. p. 443, pl. xlv. fig. 2 (1891).

Teeth in 4 or 5 series. Depth of body 2 to  $2\frac{1}{3}$  times in total length, length of head  $2\frac{1}{2}$  to  $2\frac{4}{5}$  times. Snout with straight or concave upper profile, as long as the eye in the young,  $1\frac{2}{3}$  in the adult; diameter of eye 4 to 6 times in length of head; interorbital width equal to diameter of eye in the young,  $1\frac{2}{3}$  in the adult; maxillary extending to below anterior third of eye; 4 to 6 series of scales on the cheek; large scales on the opercle. Gill-rakers moderately long, 7 to 10 on lower part of anterior arch. Dorsal X-XII 11-12; spines increasing in length to the last, which measures  $\frac{1}{3}$  to  $\frac{2}{5}$  length of head, and  $\frac{1}{3}$  to  $\frac{2}{3}$  length of longest soft rays. Pectoral  $\frac{2}{3}$  length of head. Ventral reaching vent or anal. Anal III 8-11; third spine a little shorter but stouter than longest dorsal spine. Caudal rounded. Caudal peduncle nearly as long as deep. Scales finely denticulate on the border, 28-30  $\frac{3\frac{1}{2}-4\frac{1}{2}}{12-13}$ ; lat. l.  $\frac{14-17}{10-13}$ . Dark brown or blackish, uniform or with bluish-white spots.

Total length 205 millim.

Madagascar.

2. *PARATILAPIA BLEEKERI*.

*Paratilapia bleekeri*, Sauvage, Hist. Madag., Poiss. p. 444, pl. xliv. fig. 1 (1891)<sup>1</sup>.

Closely allied to *P. polleni*, from which it differs in the shorter soft rays, the dorsal and anal being hardly longer than the longest spines. Ventral not reaching anal. Dorsal XII-XIII 10. Anal III 9. 28 scales in a longitudinal series. Brownish, the centre of each scale blue; blue spots on the anal and usually on the soft dorsal and the caudal.

Total length 110 millim.

Near Antananarivo, Madagascar.

3. *PARATILAPIA TYPUS*.

*Paracara typus*, Bleek. Versl. Ak. Amsterd. xii. 1878, p. 193, pl. iii. fig. 3; Sauvage, Hist. Madag., Poiss. p. 438, pl. 44<sup>A</sup>. fig. 8, and C, fig. 11 (1891).

Teeth in 3 or 4 series. Depth of body  $2\frac{1}{2}$  to  $2\frac{3}{4}$  times in total length, length of head  $2\frac{3}{4}$  times. Snout a little longer than the diameter of the eye, which is nearly 4 times in length of head; maxillary extending to below anterior border of eye; 5 or 6 series of scales on the cheek. Dorsal XII 9-10. Anal III 8-9. Pectoral  $\frac{3}{5}$  length of head. Ventral not reaching anal. Caudal rounded. Caudal peduncle as long as deep or a little longer than deep. Scales smooth on the anterior part of the body, ctenoid posteriorly, 30  $\frac{4}{12}$ ; lat. l.  $\frac{18-20}{13-15}$ . Greenish, with more or less distinct dark cross-bars; a blackish opercular spot.

Total length 120 millim.

Madagascar.

4. *PARATILAPIA SACRA*.

*Hemichromis sacra*, Günth. Proc. Zool. Soc. 1864, p. 493; Lortet, Arch. Mus. Lyon, iii. 1883, p. 148, pl. x. fig. 1; Tristram, Faun. Palest. p. 168, pl. xviii. fig. 2 (1884).

Teeth in 3 or 4 series in both jaws, outer largest. Lower jaw projecting. Depth of body  $2\frac{2}{3}$  to 3 times in total length, length of head  $2\frac{1}{2}$  to  $2\frac{2}{3}$  times. Snout with convex upper profile, nearly twice as long as the eye, which is 5 to 6 times in length of head and  $1\frac{1}{4}$  to  $1\frac{1}{2}$  in interorbital width; maxillary not extending to below anterior border of eye; 4 or 5 series of scales on the cheek; large scales on the opercle. Gill-rakers short, 8-11 on lower part of anterior arch. Dorsal XIV 10-11; spines increasing in length to the last, which measures about  $\frac{1}{3}$  length of head and  $\frac{2}{3}$  longest soft rays. Pectoral  $\frac{3}{4}$  to  $\frac{7}{8}$  length of head. Ventral not reaching vent. Anal III 8-9; third spine longest and strongest, nearly as long as longest dorsal spine. Caudal truncate. Caudal peduncle as long as deep. Scales smooth, 30-32  $\frac{3-4}{13-15}$ ;

<sup>1</sup> I have been unable to find a description of this species in the Bull. Soc. Philom. vi. 1882, p. 174, to which Sauvage refers in the work here quoted.



lat. l.  $\frac{13-20}{9-14}$ . Greenish olive above, silvery beneath; fins greyish, unspotted.

Total length 240 millim.

Sea of Galilee.

##### 5. PARATILAPIA LONGIROSTRIS.

*Paratilapia? longirostris*, Hilgendorf. Sitzb. Ges. nat. Fr. Berl. 1888, p. 77.

*Hemichromis longirostris*, Pfeffer, Thierw. O.-Afr., Fische, p. 20 (1896).

Teeth in 3 series in both jaws, outer largest. Lower jaw projecting. Depth of body a little less than length of head,  $3\frac{2}{5}$  times in total length. Snout with straight upper profile,  $1\frac{2}{3}$  diameter of eye, which is 5 times in length of head, and equals interorbital width; maxillary not extending to below anterior border of eye; 3 series of scales on the cheek; large scales on the opercle. Larger gill-rakers somewhat Y-shaped. Dorsal XIII 9; middle spines  $3\frac{1}{2}$  in length of head. Pectoral moderately long. Ventral not quite reaching vent. Anal III 8. Caudal almost entirely scaly. Caudal peduncle twice as long as deep. Scales finely denticulate on the border,  $32\frac{6}{12}$ . Brown above, silvery beneath; a dark spot below and in front of the eye, continued as a rather indistinct streak to the end of the snout; fins greyish or colourless.

Total length 125 millim.

Victoria Nyanza.

##### 6. PARATILAPIA MOFFATI.

*Chromys moffati*, Castelnau, Poiss. Afr. Austr. p. 16 (1861).

Teeth in 3 series in both jaws, outer largest but small. Lower jaw projecting. Depth of body equal to or a little greater than length of head,  $2\frac{2}{3}$  to  $2\frac{4}{5}$  times in total length. Snout with convex upper profile,  $1\frac{1}{3}$  diameter of eye, which is 4 times in length of head and equals interorbital width; maxillary extending to below anterior border of eye; 3 series of scales on the cheek; opercle almost entirely naked. Gill-rakers short, 7 or 8 on lower part of anterior arch. Dorsal XIII 10; spines increasing in length to the last, which measures  $\frac{1}{3}$  length of head and  $\frac{2}{5}$  longest soft rays. Pectoral  $\frac{2}{3}$  length of head. Ventral reaching vent. Anal III 8; third spine a little shorter than longest dorsal spine. Caudal rounded. Caudal peduncle as long as deep. Scales finely denticulate on the border, 26-28  $\frac{2\frac{1}{2}-3}{10}$ ; lat. l.  $\frac{10-15}{8-9}$ . Olive; a blackish opercular spot; membrane between dorsal spines bordered with black; ventrals black.

Total length 95 millim.

Pretoria, Transvaal. Three specimens, presented by Mr. W. L. Distant. The types described by Castelnau came from the Kuruman R., a tributary of the Orange R.

## 7. PARATILAPIA ROBUSTA.

*Hemichromis robustus*, Günth. Proc. Zool. Soc. 1864, p. 312.

*Hemichromis jallæ*, Bouleng. Boll. Mus. Torin. xi. 1896, no. 260.

2 or 3 series of teeth in the upper jaw, outer largest; 2 series in the lower jaw, the inner short and composed of a small number of small teeth. Lower jaw projecting. Depth of body equal to length of head, 3 times in total length. Snout with straight or slightly convex upper profile, twice as long as the eye in the adult; diameter of eye 5 to  $5\frac{2}{3}$  times in length of head, a little less than interorbital width; maxillary extending to below anterior border of eye or a little beyond; 7 to 9 series of scales on the cheek; large scales on the opercle. Gill-rakers short, the larger ones anvil-shaped, with one or two erect cusps, 10 to 12 on lower part of anterior arch. Dorsal XV–XVI 14–15; spines increasing in length to the last, which measures  $\frac{1}{4}$  to  $\frac{1}{3}$  length of head, and about  $\frac{1}{2}$  longest soft rays. Pectoral nearly  $\frac{2}{3}$  length of head. Ventral not reaching vent. Anal III 10–11; third spine longest, as long as middle dorsal spines. Caudal truncate. Caudal peduncle a little longer than deep. Scales finely denticulate on the edge, mostly cycloid in the young, 37–39  $\frac{5-6}{13-15}$ ; lat. l.  $\frac{21-24}{15-17}$ . Brown above, silvery beneath, with two dark brown or black lateral stripes, the upper running above the upper lateral line, the lower from the opercle to the base of the caudal fin; fins greyish, dorsal and caudal with round blackish spots between the rays.

Total length 300 millim.

Lake Nyassa and Upper Shiré River; Upper Zambesi.

Entertaining some doubts as to the distinction of *Hemichromis jallæ*, a species established by me on a single small specimen from Kazungula, Upper Zambesi, at a time when I was not acquainted with the young of *H. robustus*, I have, through the kindness of Prof. Camerano, re-examined the type preserved in the Turin Museum. The result of my examination appears in the above synonymy.

## 8. PARATILAPIA CAVIFRONS.

*Paratilapia? cavifrons*, Hilgend. Sitzb. Ges. nat. Fr. Berl. 1888, p. 77.

*Hemichromis cavifrons*, Pfeffer, Thierw. O.-Afr., Fische, p. 21 (1896).

Teeth in 4 series in the upper jaw, in 3 in the lower, outer largest. Lower jaw projecting. Depth of body a little greater than length of head,  $3\frac{1}{4}$  times in total length. Snout with concave upper profile, twice as long as the diameter of the eye, which is  $5\frac{1}{2}$  times in length of head, and measures nearly  $\frac{1}{2}$  interorbital width; maxillary not extending to below anterior border of eye; 7 series of scales on the cheek; large scales on the opercle. Larger gill-rakers expanded and denticulate. Dorsal XVI 8; spines

increasing in length to the eighth, which measures  $1\frac{2}{3}$  diameter of eye; longest soft rays not  $\frac{1}{2}$  length of head. Pectoral moderately long. Ventral reaching origin of anal. Anal III 9. Caudal almost entirely scaly. Caudal peduncle as long as deep. Scales finely denticulate on the border,  $32\frac{9}{14}$ . Pale greenish grey, darker on the back, dotted all over with small brown spots, one to each scale; cheeks reddish; a large bluish-black opercular spot; dorsal with rather irregular dark streaks; caudal spotted between the rays. Total length 160 millim.

Victoria Nyanza.

#### 9. PARATILAPIA RETRODENS.

*Paratilapia? retrodens*, Hilgend. Sitzb. Ges. nat. Fr. Berl. 1888, p. 76.

*Hemichromis retrodens*, Pfeffer, Thierw. O.-Afr., Fische, p. 19 (1896).

Teeth in broad bands in both jaws, in 7 series in the upper, in 9 in the lower, outer series largest. Depth of body equal to length of head,  $2\frac{7}{8}$  times in total length. Snout with convex upper profile, slightly longer than the diameter of the eye, which is somewhat more than 4 times in length of head and  $1\frac{1}{2}$  in interorbital width; maxillary extending to below anterior border of eye; 6 series of scales on the cheek; large scales on the opercle. Larger gill-rakers expanded and denticulate. Dorsal XVI 9; middle spines  $2\frac{3}{5}$  in length of head; soft rays long. Pectoral and ventral long and pointed, reaching beyond middle of base of anal. Anal III 9. Caudal almost entirely scaly. Caudal peduncle  $1\frac{1}{3}$  as deep as long. Scales finely denticulate on the border,  $30\frac{7}{11}$ . Reddish grey, with a broad dark brown stripe from the gill-opening to the base of the caudal, and another, less developed, from the nape along the base of the dorsal; a black opercular spot; breast and belly with dark spots, one to each scale; two large bluish-white ocelli close together on the posterior part of the anal; dorsal and caudal grey; pectorals greyish; ventrals black.

Total length 140 millim.

Victoria Nyanza.

#### 10. PARATILAPIA AFRA.

*Hemichromis afer*, Günth. Proc. Zool. Soc. 1893, p. 626, pl. lvii. fig. B.

Teeth in 3 series in both jaws, outer largest. Depth of body nearly equal to length of head, 3 times in total length. Snout with convex upper profile, as long as the eye, which is  $3\frac{1}{2}$  times in length of head, and equals or slightly exceeds interorbital width; maxillary not extending to below anterior border of eye; 3 or 4 series of scales on the cheek; large scales on the opercle. Gill-rakers short, 13 or 14 on lower part of anterior arch, the largest T-shaped. Dorsal XVII 8; spines increasing in length to the last, which measures  $\frac{2}{5}$  length of head and about  $\frac{3}{5}$  longest soft rays. Pectoral  $\frac{3}{4}$  length of head. Ventral reaching vent.

Anal III 6-7; third spine longest, as long as longest dorsal. Caudal rounded. Caudal peduncle slightly longer than deep. Scales finely denticulate on the border, 29-32  $\frac{3}{10}$ ; lat. l.  $\frac{21-22}{9-12}$ . Dark brown; fins blackish.

Total length 93 millim.

Lake Nyassa.

#### 11. PARATILAPIA BLOYETI.

*Hemichromis bloyeti*, Sauvage, Bull. Soc. Philom. (7) vii. 1883, p. 159.

*Hemichromis giglioli*, Pfeffer, Thierw. O.-Afr., Fische, p. 24 (1896).

2 or 3 series of minute teeth behind the marginal ones in both jaws. Depth of body equal to length of head, not quite 3 times in total length. Snout with straight upper profile, a little longer than the diameter of the eye, which is somewhat more than 4 times in length of head and a little less than interorbital width; maxillary extending to below anterior border of eye; 4 series of scales on the cheek; large scales on the opercle. Gill-rakers short, 7 on lower part of anterior arch, the larger T-shaped. Dorsal XVI 8-9; spines increasing in size, the last  $\frac{1}{2}$  in length of head and  $\frac{2}{3}$  longest soft rays. Pectoral  $\frac{2}{3}$  length of head. Ventral nearly reaching anal. Anal III 7-8. Caudal peduncle as long as deep. Scales finely denticulate on the border, 28  $\frac{4\frac{1}{2}}{10}$ . Greenish grey; a black opercular spot; a trace of a dark streak on the caudal peduncle; small dark streaks on the dorsal and caudal fins and at the base of the anal.

Total length 90 millim.

East Africa.

I have examined one of the types of the species, from Kandoa. *H. giglioli*, which, from the description, I regard as identical, is from the Kingani River.

#### 12. PARATILAPIA SERRANUS.

*Hemichromis serranus*, Pfeffer, Thierw. O.-Afr., Fische, p. 23 (1896).

Teeth in 3 series in the upper jaw, in 2 in the lower, outer largest. Lower jaw projecting. Depth of body a little less than length of head,  $3\frac{1}{2}$  times in total length. Snout with straight upper profile, slightly longer than diameter of eye, which is 4 times in length of head and equals interorbital width; maxillary extending to below eye; 4 series of scales on the cheek; opercle scaleless. Larger gill-rakers T-shaped. Dorsal XVI 9; spines increasing in length to the last, which is  $2\frac{4}{7}$  times in length of head. Pectoral and ventral pointed, reaching anal. Anal III 9. Scales faintly denticulate on the border,  $31\frac{7}{14}$ . Brownish above, whitish beneath; two black stripes on each side, the upper from the nape along the base of the dorsal, the lower from the gill-



opening to the caudal ; a large blackish opercular spot ; fins grey, unspotted.

Total length 110 millim.

Bukoba, Victoria Nyanza, German East Africa.

### 13. PARATILAPIA SCHWEBISCHII.

*Hemichromis schwebischi*, Sauvage, Bull. Soc. Zool. France, 1884, p. 198, pl. v. fig. 2.

Teeth in broad bands, in 4 or 5 series in both jaws. Lower jaw not projecting. Depth of body greater than length of head,  $2\frac{1}{3}$  times in total length. Snout with concave upper profile, a little more than twice as long as diameter of eye, which is  $5\frac{1}{2}$  times in length of head and  $\frac{1}{2}$  interorbital width ; maxillary extending a little beyond the vertical of the nostril ; 3 series of scales on the cheek ; opercle with large scales. Gill-rakers rather short, lanceolate, 22 on lower part of anterior arch. Dorsal XV 11 ; spines increasing in length to the last, which is a little less than  $\frac{1}{2}$  as long as the head and  $\frac{2}{5}$  length of longest soft rays. Pectoral as long as head. Ventral reaching anal. Anal III 9. Caudal slightly emarginate. Caudal peduncle as long as deep. Scales rough, finely denticulate,  $30\frac{3}{10}$  ; lat. 1.  $2\frac{0}{2}$ . Olive ; scales on posterior part of body golden in the centre ; spinous dorsal marbled with purplish ; posterior part of soft dorsal and caudal with blue spots ; ventrals and pectorals colourless.

Total length 320 millim.

Upper Ogowe.

The diagnosis is drawn up from the type specimen preserved in the Paris Museum.

### 14. PARATILAPIA MODESTA.

*Hemichromis modestus*, Günth. Proc. Zool. Soc. 1893, p. 625, pl. lvii. fig. A.

Teeth in 3 or 4 series in both jaws, outer largest. Lower jaw projecting. Depth of body equal to or a little less than length of head,  $2\frac{2}{3}$  to 3 times in total length. Snout with straight or slightly convex upper profile,  $1\frac{1}{2}$  to  $1\frac{2}{3}$  as long as the eye, which is 4 to  $4\frac{1}{2}$  times in length of head and  $\frac{2}{3}$  to  $\frac{3}{4}$  interorbital width ; maxillary extending to below anterior border of eye or not quite so far ; 3 series of scales on the cheek ; large scales on the opercle. Gill-rakers short, a few T-shaped, 10 to 12 on lower part of anterior arch. Dorsal XVI 10-11 ; spines increasing in length to the last, which measures  $\frac{1}{3}$  to  $\frac{2}{5}$  length of head, and  $\frac{3}{5}$  longest soft rays. Pectoral  $\frac{2}{3}$  length of head. Ventral reaching origin of anal. Anal III 8-9 ; third spine longest, a little shorter than last dorsal spine. Caudal rounded. Caudal peduncle slightly longer than deep. Scales finely denticulate on the border,  $32-34\frac{3\frac{1}{2}-4}{12-13}$  ; lat. 1.  $\frac{21-24}{13-14}$ . Uniform dark brown, fins blackish.

Total length 200 millim.

Lake Nyassa and Upper Shiré River.

15. *PARATILAPIA LIVINGSTONII*.

*Hemichromis livingstonii*, Günth. Proc. Zool. Soc. 1893, p. 625, pl. lvi. fig. B.

Teeth in 4 or 5 series in both jaws, outer largest. Depth of body equal to length of head, nearly 3 times in total length. Snout with straight upper profile,  $1\frac{1}{2}$  to 2 times diameter of eye, which is 4 to 5 times in length of head and  $1\frac{1}{4}$  to  $1\frac{1}{2}$  in interorbital width; maxillary not extending to below anterior border of eye; 4 series of scales on the cheek; large scales on the opercle. Gill-rakers short, 11 or 12 on lower part of anterior arch. Dorsal XVI 10–11; spines increasing in length to the last, which measures  $\frac{1}{3}$  to  $\frac{2}{5}$  length of head and  $\frac{3}{4}$  longest soft rays. Pectoral  $\frac{4}{5}$  length of head. Ventral reaching vent. Anal III 9; third spine as long as longest dorsal. Caudal truncate. Caudal peduncle slightly longer than deep. Scales finely denticulate on the border, 35–36  $\frac{4-5}{13}$ ; lat. l.  $\frac{23}{14-15}$ . Silvery, largely and irregularly marbled with black.

Total length 180 millim.

Lake Nyassa and Upper Shiré River.

16. *PARATILAPIA INTERMEDIA*.

*Hemichromis intermedius*, Günth. Proc. Zool. Soc. 1864, p. 312.

Teeth small, in 2 or 3 series in each jaw, outer largest. Depth of body  $2\frac{1}{2}$  to  $2\frac{3}{4}$  times in total length, length of head 3 to  $3\frac{1}{2}$  times. Snout with straight upper profile,  $1\frac{1}{3}$  to  $1\frac{1}{2}$  diameter of eye (in the adult), which is 4 times in length of head and nearly equal to or a little greater than interorbital width; maxillary not extending to below anterior border of eye; 2 or 3 series of scales on the cheek; large scales on the opercle. Gill-rakers rather long, close-set, 20 to 27 on lower part of anterior arch, a few of the larger ones sometimes Y-shaped. Dorsal XV–XVIII 9–11; spines increasing in length to the last, which measures little less than  $\frac{1}{2}$  length of head, and  $\frac{1}{2}$  to  $\frac{4}{5}$  length of longest soft rays. Pectoral as long as head. Ventral reaching vent, or produced to the anterior soft rays of anal. Anal III 9–10; third spine strongest, as long as fifth dorsal spine. Caudal more or less extensively scaly, emarginate. Caudal peduncle  $1\frac{1}{2}$  as long as deep. Scales very finely denticulate on the edge, 33–36  $\frac{3}{10-11}$ ; lat. l.  $\frac{20-30}{14-15}$ . Pale olive to dark brown, with a more or less distinct blackish spot under the lateral line, below middle of spinous dorsal, and another at base of caudal; dorsal and anal dark brown, often with a broad whitish border, with or without round whitish spots; pectoral whitish, ventral dark brown.

Total length 180 millim.

Lake Nyassa and Upper Shiré River.

17. *PARATILAPIA DIMIDIATA*.

*Hemichromis dimidiatus*, Günth. Proc. Zool. Soc. 1864, p. 313.

Teeth in 3 series in both jaws, the outer series composed of

long teeth rather wide apart. Lower jaw projecting. Depth of body  $3\frac{1}{2}$  times in total length, length of head 3 times. Snout with convex upper profile, twice as long as the eye; diameter of eye 5 to  $5\frac{1}{2}$  times in length of head,  $1\frac{1}{3}$  in interorbital width; maxillary not extending to below anterior border of eyes; 4 or 5 series of scales on the cheek; large scales on the opercle. Gill-rakers short, 11 on lower part of anterior arch. Dorsal XVI 10-11; spines increasing in length to the last, which measures  $\frac{1}{3}$  length of head and about  $\frac{2}{3}$  longest soft rays. Pectoral  $\frac{2}{3}$  length of head. Ventral not reaching vent. Anal III 10-11; third spine longest, as long as middle dorsal spines. Caudal very slightly emarginate. Caudal peduncle  $1\frac{2}{3}$  to 2 times as long as deep. Scales not denticulate, 35-36  $\frac{3}{12-13}$ ; lat. l.  $\frac{22}{15}$ . Olive-brown above, silvery beneath; a blackish stripe from above the pectoral to the base of the caudal; fins whitish, unspotted.

Total length 220 millim.

Lake Nyassa and Upper Shiré River.

#### 18. PARATILAPIA LONGICEPS.

*Hemichromis longiceps*, Günth. Proc. Zool. Soc. 1864, p. 313.

Teeth in 2 series in both jaws, outer largest, long and sharp and rather wide apart. Depth of body 4 times in total length, length of head  $2\frac{2}{3}$  to 3 times. Snout long and strongly compressed, with convex upper profile; diameter of eye 2 to  $2\frac{1}{2}$  times in length of snout, 5 to  $5\frac{1}{2}$  times in length of head,  $1\frac{1}{2}$  in interorbital width; maxillary widely separated from the vertical of the eye; 3 series of scales on the cheek; opercle partially naked. Gill-rakers rather long, about  $\frac{1}{2}$  length of gill-fringes, 17 on lower part of anterior arch. Dorsal XVII-XVIII 12; spines increasing in length to the last, which measures  $\frac{1}{4}$  length of head. Pectoral  $\frac{3}{5}$  length of head. Ventral not reaching vent. Anal III 9-10; third spine longest, as long as last dorsal. Caudal slightly emarginate. Caudal peduncle nearly twice as long as deep. Scales finely denticulate on the border, 40-41  $\frac{3\frac{1}{2}}{11}$ ; lat. l.  $\frac{24-28}{18-24}$ . Silvery, blackish on the back; a blackish opercular spot; fins greyish, immaculate.

Total length 240 millim.

Lake Nyassa and Upper Shiré River.

Three of the "*Chromis*" described by Castelnau from Lake Ngami very probably belong to this genus and appear to be based on individual variations of a single species:—

#### PARATILAPIA THUMBERGII.

*Chromys thumbergi*, Castelnau, Poiss. Afr. Austr. p. 13 (1861).

*Chromys ngamensis*, Casteln. l. c.

*Chromys livingstonii*, Casteln. l. c.

Teeth in 3 or 4 series. Body rather elongate. Dorsal XVII 13-14. Anal III 9. Golden, dark green, or blackish, with or

without red borders to the scales; dorsal grey, with round black spots or red dots or edged with yellow; anal grey, with or without green spots, edged with yellow or red.

Total length 330 millim.

Lake Ngami.

#### 4. PELMATOCHROMIS.

*Pelmatochromis*, Steindachner, Notes Leyd. Mus. xvi. 1894, p. 40.

Characters of *Paratilapia*, with the addition of a much-developed cushion-like papillose pad of mucous membrane on each side of the palate, close to the upper part of the branchial arches<sup>1</sup>.

West Africa; Congo.

#### *Synopsis of the Species.*

- I. 6 or 7 series of teeth in the jaws; dorsal XIV 21-12; pectoral nearly as long as head; scales very finely denticulate on the edge, 26-27  $\frac{3-3\frac{1}{2}}{8-10}$  ..... 1. *buettikoferi*, Sldr.
- II. 2 or 3 series of teeth in the jaws.
- A. Lower lateral line at least nearly as long as upper; pectoral as long as head.
- Dorsal XIII-XIV 17; scales finely denticulate, 40  $\frac{6}{\frac{15}{3}}$ ;
- lat. l.  $\frac{23-29}{26-27}$  ..... 2. *jentinki*, Sldr.
- Dorsal XVI 12; scales cycloid, 32  $\frac{4}{2}$ ; lat. l.  $\frac{23-24}{28-29}$  ... 3. *lateralis*, Blgr.
- B. Lower lateral line short, confined to the caudal region; scales cycloid.
1. Pectoral as long as head; dorsal XIII 11; scales 30  $\frac{4}{11}$ ; lat. l.  $\frac{21}{10}$  ..... 4. *congius*, Blgr.
2. Pectoral  $\frac{2}{3}$  length of head.
- Dorsal XIV 11; scales 32  $\frac{3\frac{1}{2}}{9}$ ; lat. l.  $\frac{21}{14}$ ; maxillary not extending to below anterior border of eye ..... 5. *welwitschi*, Blgr.
- Dorsal XVI 9; scales 31  $\frac{2\frac{1}{2}}{10}$ ; lat. l.  $\frac{20}{12}$ ; maxillary not extending to below anterior border of eye ..... 6. *guentheri*, Sauv.
- Dorsal XIV-XVI 8-9; scales 26-28  $\frac{2-2\frac{1}{2}}{11}$ ; lat. l.  $\frac{16-18}{5-9}$ ; maxillary extending to below anterior border of eye ..... 7. *subocellatus*, Gthr.

#### 1. PELMATOCHROMIS BUETTIKOFERI.

*Paratilapia (Pelmatochromis) buettikoferi*, Steindachn. Notes Leyd. Mus. xvi. 1894, p. 40.

Teeth in broad bands, in about 7 series in the upper jaw, in 6 in

<sup>1</sup> This gives the impression, on a superficial glance under the opercle, of a lobe to the outer branchial arch, as in *Geophagus*. A similar pad is more or less developed in *Tilapia*, especially in *T. oligacanthus*, Blkr., which has for this reason been raised to generic rank (*Ptychochromis*, Sldr.).



the lower. Depth of body 2 to  $2\frac{1}{4}$  times in total length, length of head  $2\frac{2}{3}$  to  $2\frac{3}{4}$ . Snout a little longer than the diameter of the eye, which is contained 3 to  $3\frac{1}{4}$  times in length of head and measures a little more than interorbital width; maxillary extending to below anterior border of eye; 3 or 4 rows of scales on the cheek; very large scales on the opercle. Gill-rakers long and slender, 6-9 on lower part of anterior arch. Dorsal XIV 11-12; spines increasing in length to the seventh or to the last, which is  $2\frac{1}{5}$  to  $2\frac{3}{5}$  times in length of head, and about  $\frac{3}{5}$  length of longest soft rays. Pectoral nearly as long as head. Outer ventral ray produced, filiform, reaching third anal spine. Anal III 8; third spine nearly as long as but thicker than longest dorsal spine. Caudal emarginate. Scales very finely denticulate on the edge, 26-27  $\frac{3-3\frac{1}{2}}{8-10}$ ; lat. l.  $\frac{17-19}{9-11}$ . Body with five ill-defined brown bars; a large steel-blue opercular spot; dorsal and caudal streaked with bluish and yellowish.

Total length 180 millim.

Liberia.

## 2. PELMATOCHROMIS JENTINKI.

*Paratilapia (Pelmatochromis) jentinkii*, Steindachn. Notes Leyd. Mus. xvi. 1894, p. 43, pl. ii. fig. 1.

3 series of teeth in the upper jaw, 2 in the lower. Depth of body  $2\frac{1}{3}$  to  $2\frac{2}{5}$  times in total length, length of head 3 times. Snout longer than the diameter of the eye, which is contained  $3\frac{1}{2}$  to  $3\frac{2}{3}$  times in length of head, and nearly equals interorbital width; maxillary not extending to below anterior border of eye; 3 rows of scales on the cheek; moderate-sized scales on the opercle. Gill-rakers moderately long, hooked, 12 or 13 on lower part of anterior arch. Dorsal XIII-XIV 17; spines increasing in length to the last, which measures a little less than  $\frac{1}{2}$  length of head, and about  $\frac{3}{4}$  longest soft rays. Pectoral falciform, longer than the head. Outer ventral ray produced, filiform. Anal III 8-9; third spine as long as but stronger than longest dorsal spine, little shorter than longest soft rays. Caudal emarginate. Caudal peduncle as long as deep. Scales very finely denticulate on the edge, 40  $\frac{6}{15}$ ; lat. l.  $\frac{28-29}{26-27}$ , the lower beginning a short distance behind the shoulder. Golden; dorsal with straight horizontal violet streaks; anal with oblique violet streaks.

Total length 290 millim.

Liberia.

## 3. PELMATOCHROMIS LATERALIS.

*Pelmatochromis guentheri*, Bouleng. Ann. & Mag. N. H. (6) xvii. 1896, p. 310.

3 series of minute teeth in both jaws. Depth of body  $2\frac{2}{5}$  times in total length, length of head 3. Snout  $1\frac{1}{3}$  diameter of eye, which is  $3\frac{1}{3}$  in length of head and equals interorbital width;

maxillary extending to below the nostril; 4 series of scales on the cheek; large scales on the opercle. Gill-rakers short, with wing-like basal process, 16 on lower part of anterior arch. Dorsal XVI 12; spines subequal from the fifth,  $\frac{1}{2}$  length of head. Pectoral falciform, as long as head. Ventral reaching anal. Anal III 7; third spine longest, longer than dorsals. Caudal scaly, slightly emarginate. Caudal peduncle as long as deep. Scales cycloid,  $32 \frac{2}{8}$ ; lat. l.  $\frac{23-24}{28-29}$ , the upper ending below the last dorsal rays, the lower extending from the shoulder to the caudal, on which it is produced in three branches. Uniform pale brownish; dorsal membrane checkered with brown and white spots.

Total length 107 millim.

Upper Congo.

As Sauvage's *Hemichromis guentheri* turns out to belong to the genus *Pelmatochromis*, I am obliged to change the name first proposed for the present species.

#### 4. PELMATOCHROMIS CONGICUS.

*Pelmatochromis congicus*, Bouleng. Ann. & Mag. N. H. (6) xx. 1897, p. 422.

3 series of teeth in both jaws. Depth of body  $2\frac{1}{4}$  times in total length, length of head  $2\frac{3}{4}$  times. Snout as long as diameter of eye, which is  $2\frac{2}{3}$  in length of head and equals interorbital width; maxillary extending to below anterior third of eye; 4 series of scales on the cheek; opercle naked (?). Gill-rakers long and slender, about 20 on lower part of anterior arch. Dorsal XIII 11, spines subequal from the sixth, nearly  $\frac{1}{2}$  length of head and  $\frac{2}{5}$  longest soft rays, which are produced and filiform. Pectoral as long as head. Ventral with produced outer rays, reaching anal spines. Anal III 8; third spine as long as and stronger than longest dorsal spines. Caudal rounded. Caudal peduncle a little deeper than long. Scales cycloid,  $30 \frac{4}{11}$ ; lat. l.  $\frac{21}{10}$ . Olive, with yellowish spots occupying the centres of the scales; a rather indistinct dark lateral streak; vertical fins blackish, with round yellow spots.

Total length 175 millim.

Stanley Falls, Congo River.

#### 5. PELMATOCHROMIS WELWITSCHI, sp. n. (Plate XIX. fig. 1.)

Teeth in 2 or 3 series in the upper jaw, in 3 in the lower. Depth of body equal to length of head, 3 times in total length. Snout with straight upper profile, twice as long as the diameter of the eye, which is 5 times in length of head and a little less than interorbital width; maxillary not extending to below anterior border of eye; 5 rows of scales on the cheek; large scales on the opercles. Gill-rakers short, denticulate, 9 on the lower part of anterior arch. Dorsal XIV 11; spines increasing in length to the seventh, which measures  $\frac{1}{3}$  length of head and  $\frac{1}{2}$  longest soft rays. Pectoral  $\frac{2}{3}$  length of head. Ventral not reaching vent. Anal III 7;

third spine a little shorter than longest dorsal spines. Caudal truncate. Caudal peduncle a little longer than deep. Scales cycloid,  $32 \frac{3\frac{1}{2}}{9}$ ; lat. l.  $\frac{2\frac{1}{4}}{14}$ . Pale brown; dorsal dark brown, whitish at the base; anal with a few round pure white spots; ventrals blackish.

Total length 125 millim.

Fluilla, Angola. A single specimen, collected by the late Dr. Welwitsch.

#### 6. PELMATOCHROMIS GUENTHERI.

*Hemichromis guentheri*, Sauvage, Bull. Soc. Zool. France, 1882, p. 317, pl. v. fig. 1.

*Hemichromis volta*, Steind. Sitzb. Ak. Wien, xvi. i. 1887, p. 60, pl. i. fig. 3.

Teeth in 3 series in each jaw, outer largest but rather small. Depth of body  $2\frac{2}{3}$  times in total length, length of head 3. Snout with straight upper profile, nearly twice as long as the eye, which is contained  $4\frac{1}{2}$  times in length of head and nearly equals interorbital width; maxillary not extending to below anterior border of eye; 4 series of scales on the cheek; large scales on the opercle. Gill-rakers short, some T-shaped, 12 on lower part of anterior arch. Dorsal XVI 9; spines subequal, last  $\frac{2}{5}$  length of head and  $\frac{1}{2}$  longest soft rays. Pectoral  $\frac{2}{3}$  length of head. Anal III 7; third spine a little shorter than longest dorsals. Caudal truncate. Caudal peduncle as long as deep. Scales smooth,  $31 \frac{2\frac{1}{2}}{10}$ ; lat. l.  $\frac{2\frac{0}{1}}{12}$ . Pale olive; a few round blackish spots on the membrane between the dorsal spines.

Total length 140 millim.

Gold Coast.—The diagnosis is taken from the unique specimen in the Paris Museum.

#### 7. PELMATOCHROMIS SUBOCELLATUS.

*Hemichromis subocellatus*, Günth. Proc. Zool. Soc. 1871, p. 667, pl. lxvii. fig. C.

Teeth in 2 or 3 series in each jaw, outer largest but small. Depth of body  $2\frac{1}{2}$  to  $2\frac{3}{4}$  in total length, length of head 3 times. Snout with convex upper profile, as long as the eye, which is contained  $3\frac{1}{2}$  times in length of head and equals interorbital width; maxillary extending to below anterior border of eye; 2 or 3 series of scales on the cheek; large scales on the opercle. Gill-rakers short, some T-shaped, 10 on lower part of anterior arch. Dorsal XIV–XVI 8–9; spines subequal, about  $\frac{1}{3}$  length of head and  $\frac{1}{2}$  longest soft rays. Pectoral  $\frac{2}{3}$  length of head. Ventral reaching vent or beyond origin of anal. Anal III 6–8; third spine as long as or a little longer than longest dorsals. Caudal rounded. Caudal peduncle a little deeper than long. Scales smooth,  $26\text{--}28 \frac{2\text{--}2\frac{1}{2}}{11}$ ; lat. l.  $\frac{16\text{--}18}{5\text{--}9}$ . Brown, with more or less distinct blackish opercular spots and a rather indistinct dark lateral stripe; specimens with shorter ventrals (females?) have a blackish blotch or

ocellus on the soft dorsal; a black, white-edged ocellus sometimes present in the upper part of the caudal.

Total length 75 millim.

Gaboon.

### 5. CHROMIDOTILAPIA, g. n.

Body moderately elongate; scales cycloid. Teeth in a single or double series, the inner, if present, short or irregular; some of the larger ones with the crown bent at an angle to the shaft and directed backwards. Maxillary exposed. A cushion-like papillose pad on each side of the palate, close to the upper part of the branchial arches. Dorsal with 14 to 16 spines, anal with 3. Vertebrae 27 (14+13).

West Africa.

#### 1. CHROMIDOTILAPIA KINGSLEYÆ, sp. n. (Plate XIX. fig. 2.)

*Hemichromis schwebischi* (non Sauvage), Günth. Ann. & Mag. N. H. (6) xvii. 1896, p. 273.

Teeth in a single or double series, the inner, if present, short and irregular. Depth of body  $2\frac{1}{2}$  to  $2\frac{4}{5}$  times in total length, length of head  $2\frac{2}{3}$  to 3 times. Snout with straight upper profile,  $1\frac{3}{4}$  to 2 times as long as the diameter of the eye (in the adult), which is 4 to  $4\frac{1}{2}$  times in length of head and equal to or a little less than interorbital width; maxillary not reaching to below anterior border of eye; four series of scales on the cheek; large scales on the opercle. Gill-rakers on lower part of anterior arch short and broad, crenulated, 10 to 12. Dorsal XIV–XVI 10–12; spines increasing in length to the last, which is about  $\frac{2}{5}$  length of head and hardly  $\frac{1}{2}$  longest soft rays. Pectoral  $\frac{2}{3}$  to  $\frac{3}{4}$  length of head. Ventrals reaching vent or anal. Anal III 8–9; third spine as long as or a little shorter than longest dorsal spine. Caudal rounded. Caudal peduncle a little deeper than long. Scales with smooth border, 29–32  $\frac{2\frac{1}{2}-3}{9}$ ; lat. l.  $\frac{19-21}{6-10}$ . Brownish, uniform or with rather indistinct traces of six darker cross-bars; a more or less distinct dark opercular spot; fins greyish, blackish towards the border; soft dorsal and caudal, in some specimens, with regular squarish dark spots forming bars between the rays.

Total length 150 millim.

Gaboon, Ogowe.

#### 2. CHROMIDOTILAPIA (?) FREDERICI.

*Chromys frederici*, Castelnau, Poiss. Afr. Austr. p. 15 (1861).

Teeth few, wide apart, in a single series except in front of the lower jaw. Body rather elevated. Dorsal XV 14. Anal III 8. Pectoral moderate. Scales finely granulate, with smooth edge. Lat. l.  $\frac{2\frac{2}{4}}{4}$ . Greyish white; dorsal tipped with reddish; anal red; ventrals greenish; caudal reddish.

Total length 230 millim.

Lake Ngami.—Known only from Castelnau's very imperfect definition.



## 6. COREMATODUS.

*Corematodus*, Bouleng. Proc. Zool. Soc. 1896, p. 918.

Body short; scales cycloid. Jaws with extremely broad bands of innumerable minute club-shaped teeth with compressed oblique entire crowns. Dorsal with 16 spines, anal with 3. Vertebrae 32 (15+17).

A single species.

## 1. COREMATODUS SHIRANUS.

*Corematodus shiranus*, Bouleng. op. cit. p. 919, cum fig.

Depth of body equal to length of head,  $\frac{1}{3}$  total length. Snout very broad, with steep, convex profile; eye a little nearer gill-opening than end of snout, its diameter  $4\frac{1}{2}$  times in length of head, twice in interorbital width, and greater than depth of præorbital; maxillary extending to below anterior border of eye; cheek with 4 rows of scales below the eye; opercle and interorbital region scaleless; limbs of præopercle forming a right angle. Gill-rakers moderately long, 12 on lower part of anterior arch, last bifid. Dorsal XVI 10; spines increasing in length to the last, which is  $\frac{2}{3}$  length of head. Anal III 8; third spine longest, as long as but thicker than middle dorsals. Caudal peduncle  $1\frac{1}{2}$  as long as deep. Scales slightly rugose, not denticulate,  $34\frac{3}{9}$ ; lat. l.  $\frac{20}{2}$ . Body with traces of six black cross-bars.

Total length 200 millim.

Upper Shiré River.

## EXPLANATION OF PLATE XIX.

Fig. 1. *Pelmatochronis welwitshi* Blgr., p. 149. 1a. Jaws,  $\times 3$ .

Fig. 2. *Chromidotilapia kingsleyæ* Blgr., p. 151. 2a. Jaws,  $\times 3$ . 2b. Gill-chamber, seen from below the opercle,  $\times 2$ .

3. The Myology of the Terrestrial Carnivora.—Part II.  
By B. C. A. WINDLE, M.A., M.D., D.Sc., Professor of Anatomy at Mason University College, Birmingham, and F. G. PARSONS, F.R.C.S., F.Z.S., F.I.L.S., Lecturer on Comparative Anatomy at St. Thomas's Hospital, and Hunterian Professor at the Royal College of Surgeons.

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The first part of this paper was read before this Society on April 6th last year (see P. Z. S. 1897, p. 370); it contained an account of the muscles of the head, neck, and fore-limb. The present part contains a description of the muscles of the hind-limb and trunk. As we have been able to dissect some additional